Chapter 12
Enhancing Digital Repositories with Learning Object Metadata

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ABSTRACT

In this chapter the authors present the basic characteristics about some existing educational metadata schemata and application profiles. They focus on the widely adopted IEEE LOM standard and give a brief analysis of its structure. Having in mind the utilization of educational metadata schemata by digital repositories preserving educational and research resources, they concentrate on a considerably popular system for this reason, DSpace. The authors want to show how the IEEE LOM metadata set can be incorporated in the default DSpace’s qualified Dublin Core metadata schema, introducing enhancements to the existing University of Patras live installation. For this reason, they document a potential LOM to Dublin Core metadata mapping and reveal possible gains from such an attempt. Further, they propose an ontological model for the repository’s metadata that takes also into account the educational characteristics of resources. In this way, they show how a semantic level of interoperability between educational applications can be achieved.

INTRODUCTION

The rapid growth of the World Wide Web in the past few years has led to a considerable increase of educational material that is available in electronic form. The increased amount of digital information renders the efficient search and retrieval of educational resources a more complex and difficult process. For this reason, it is of crucial importance the proper description and characterization of electronically available learning objects, using
Educational metadata. Such an effort would ensure the reusability and discoverability of learning objects whereas it would facilitate the interoperability of educational applications.

Having these in mind, our work is focused on one of the most popular existing metadata schemata, namely the IEEE LOM standard. LOM includes “the minimal set of attributes needed to allow learning objects to be managed, located, and evaluated” (Nair, & Jeevan, 2004) and has proved to be a widely adopted and internationally recognized open standard for the description of learning objects. But apart from IEEE LOM, other metadata schemata with similar characteristics have been deployed over time, aiming at fulfilling the same requisites in the race for the efficient management of educational resources. All of these standards, either directly related to LOM or not, make their own contribution to the characterization of learning objects and play an important role in the exchange of information in an interoperable way.

Nevertheless, the increasing number of applications that exploit educational metadata as well as the existence of many metadata specifications, sometimes poses the adoption of a sole metadata schema by an application a rather inefficient solution. As a better practice towards this direction, the use of application profiles is suggested. An application profile is defined as a combination of elements coming from different metadata schemata and is usually created in order to satisfy the needs of a particular application.

All these deployed metadata models are mainly utilized by digital repository systems that aim at preserving and managing educational material. A very popular system implemented for this reason is DSpace. On top of DSpace many institutional repositories have been built worldwide. These systems exploit DSpace’s inherent facilities and the fact that it uses the qualified Dublin Core element set as its base metadata schema. However, this schema is sometimes proven to be inadequate for the efficient characterization of the great amount of the educational and research assets that we imported in institutional or other repositories of related purpose. That’s why the deployment of an application profile, extended with learning object metadata and specific to the needs of an educational repository, is attempted through this work.

This article is further organized as follows: We start by presenting the basic structure of the IEEE LOM schema. We then give a brief overview about other widely known learning object metadata standards and see how these standards may be related to the IEEE LOM. Some profiles specific to educational applications are also mentioned. In the next section we describe how we managed to incorporate the LOM metadata schema in the University of Patras institutional repository, which is built upon the DSpace system. Furthermore, we analyze the implemented enhancements to this particular digital repository system and explain how they can improve the end-user experience and interaction with the overall system. We proceed by referring some issues regarding interoperability and semantics in digital repository systems that manage educational resources. Finally, we talk about possible future implementations regarding the best possible utilization of learning objects through similar kind of repositories.

**LEARNING OBJECT METADATA STANDARDS**

*Learning objects*(Wiley, 2002), have been defined as “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning”. In (Danziel, 2002) learning objects are defined as “an aggregation of one or more digital assets, incorporating meta-data, which represent an educationally meaningful stand-alone unit” and according to (IEEE LTSC, 2002), a learning object is “any entity -digital or non-digital- that may be used for learning, education or training”. Examples of reusable digital